大阪大学データビリティフロンティア機構
Osaka University Institute for Datability Science

Noa Garcia
noagarcia@ids.osaka-u.ac.jp

Benjamin Renoust
renoust@ids.osaka-u.ac.jp

Yuta Nakashima
n-yuta@ids.osaka-u.ac.jp

Context-Aware Embeddings for Automatic Art Analysis

Motivation

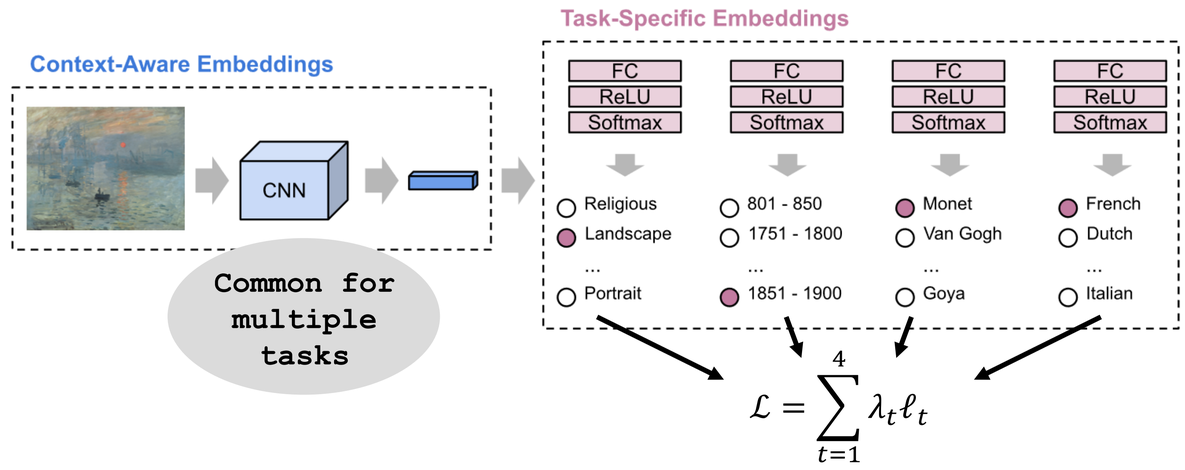
- We study paintings through their artistic **attributes**.
- Paintings are strongly influenced by their **context**.
- Artistic attributes are **highly correlated** to each other.

We propose…

Two methods to capture context from paintings.

Multitask Learning

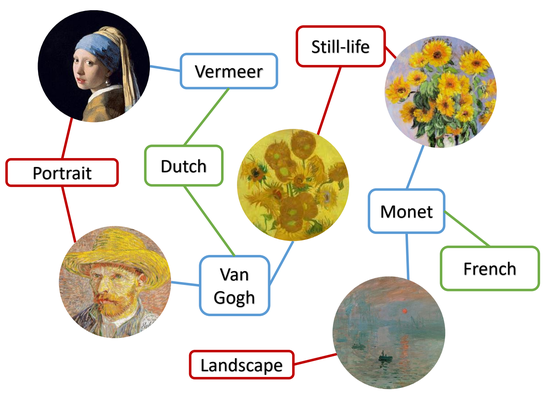
Captures **visual** relationships.



Knowledge Graph Model

Captures **non-visual** relationships between attributes.

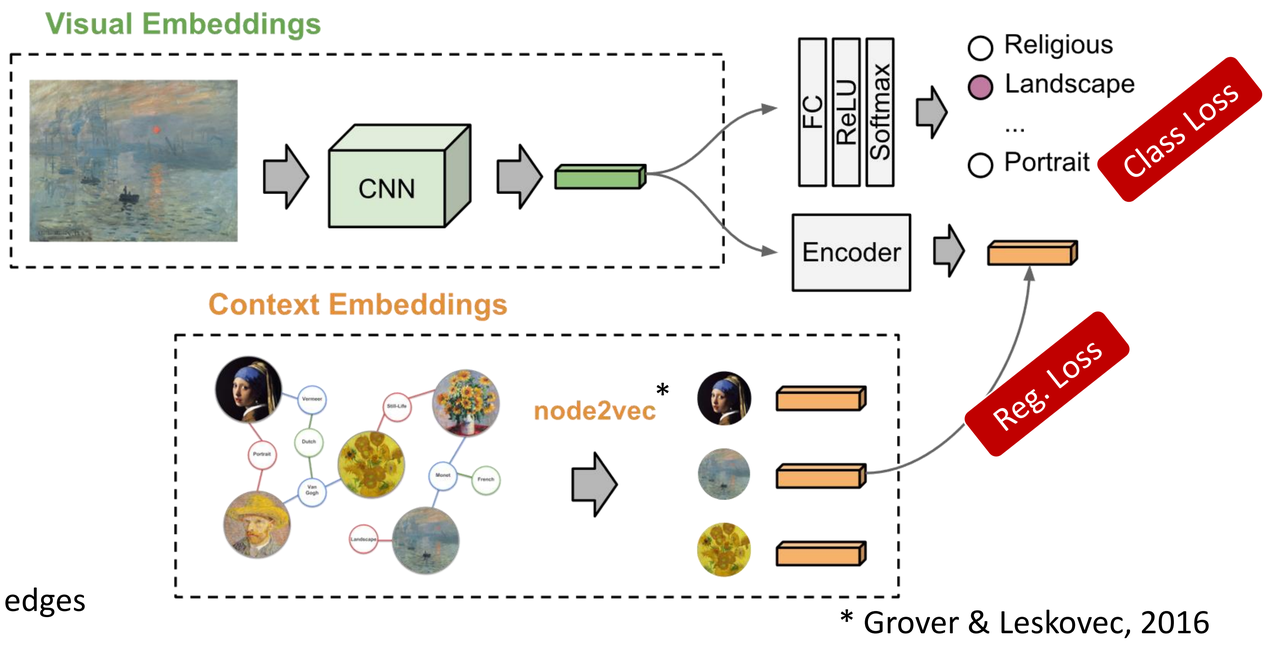
1. Knowledge Graph



We build an artistic KG to connect paintings with their attributes.

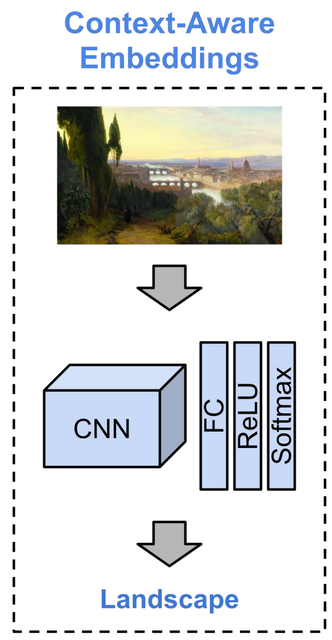
✓19,244 paintings ✓13,904 attributes ✓125,506 edges

2. Training



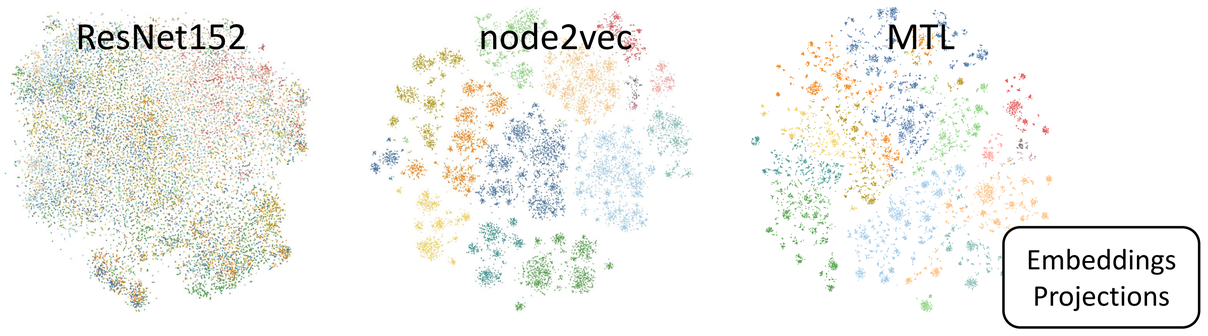
* Grover & Leskovec, 2016

3. Test

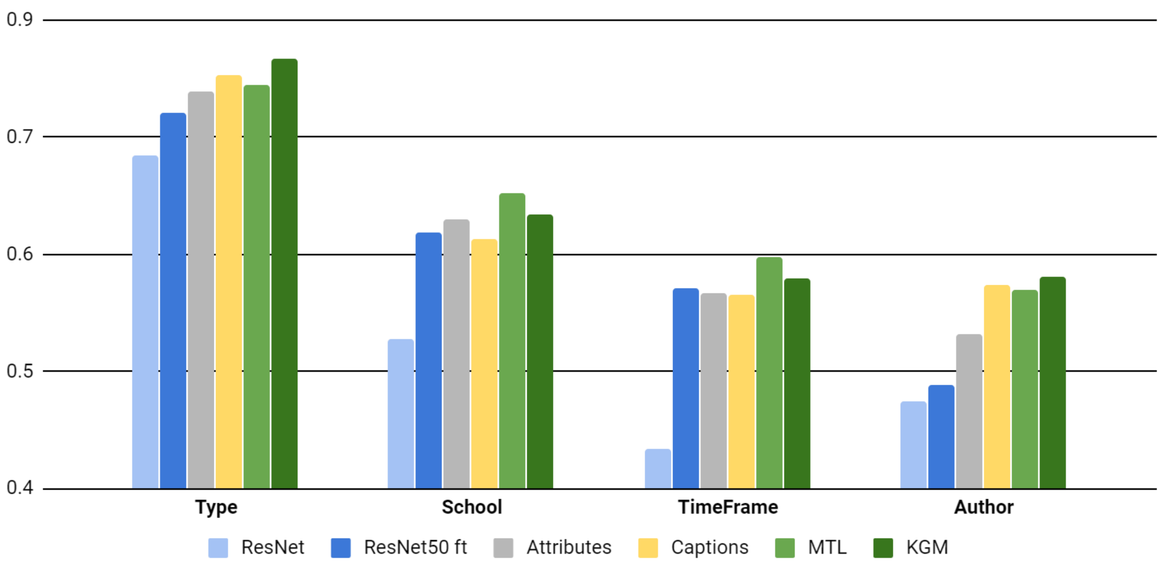


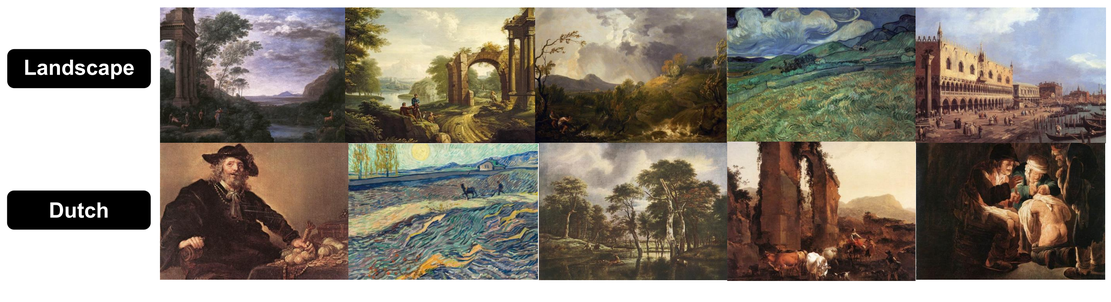
Experiments

- SemArt Dataset (Garcia & Vogiatzis, 2018).
- 21,384 paintings, with attributes and comments.
- Evaluation in **art classification** and **multimodal retrieval**.

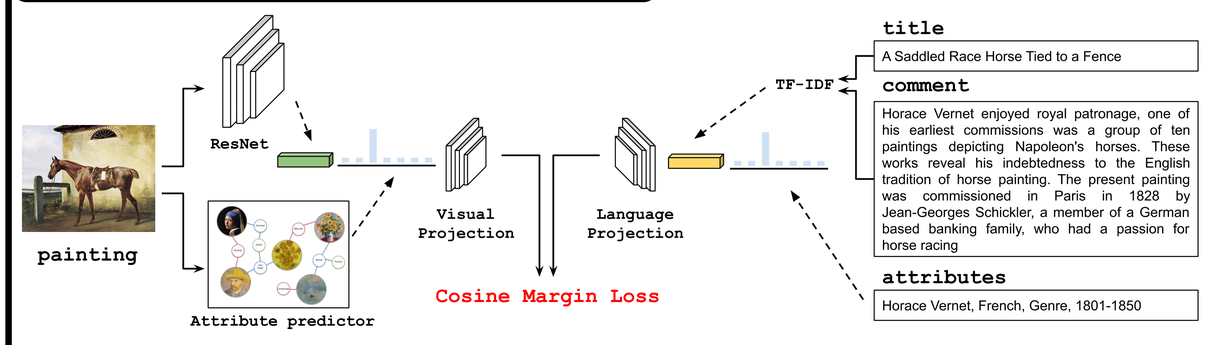


Art Classification





Multimodal Retrieval



TYPE	R@1	R@5	R@10	MedR
No attributes	0.164	0.332	0.454	14
ResNet	**0.178**	**0.383**	**0.525**	**9**
MTL	0.145	0.358	0.474	12
KGM	0.152	0.367	0.506	10

SCHOOL	R@1	R@5	R@10	MedR
No attributes	0.164	0.332	0.454	14
ResNet	0.192	0.386	0.507	10
MTL	**0.196**	**0.428**	**0.536**	**8**
KGM	0.162	0.371	0.483	12

TIMEFRAME	R@1	R@5	R@10	MedR
No attributes	0.164	0.332	0.454	14
ResNet	0.127	0.332	0.434	18
MTL	0.171	0.394	**0.525**	**9**
KGM	**0.175**	**0.399**	0.506	10

AUTHOR	R@1	R@5	R@10	MedR
No attributes	0.164	0.332	0.454	14
ResNet	0.236	0.451	0.572	7
MTL	0.232	0.452	0.567	7
KGM	**0.247**	**0.477**	**0.581**	**6**

Garcia & Vogiatzis. How to Read Paintings: Semantic Art Understanding with Multi-Modal Retrieval. ECCVW 2018.

Grover & Leskovec. node2vec: Scalable feature learning for networks. SIGKDD 2018.